GOVERNMENT OF INDIA

METEOROLOGICAL DEPARTMENT

# INDIA WEATHER REVIEW, 1961

## Annual Summary

## PART B

## SNOWFALL



CONTENTS



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# INDIA WEATHER REVIEW, 1961

## ANNUAL SUMMARY

## PART B

## SNOWFALL

This part contains a summary of the reports of snowfall in the mountain regions to the north of India based on (a) records of snowfall observations made at the observatories and (b) reports collected by local officers from the local residents, headmen of villages or from travellers who have passed through the region, and then transmitted to this office.

The amount of snowfall is usually measured by finding the depth of undisturbed snow lying on the ground. The measurements are given in metres or centimetres. At places provided with raingauges, the snow collected in the gauge is melted and measured as rain. The heights of well known peaks are reported in the nearest metres, wherever available, while the heights of mountain ranges etc. are reported in tens of metres.

Cold Weather / Winter Period - January and February

### I. JAMMU AND KASHMIR

SOUTH ANANTNAG DISTRICT

Srinagar (1585 m.) - In January, snowfall was experienced in the valley from the 28th to 31st. The total depth of snowfall recorded was 17 cm. and the total precipitation was 8.1 cm. There were sixteen occasions of snowfall in the valley in February, the total precipitation amounting to 5.1 cm. A thick layer of snow was visible on all the surrounding peaks during both the months.

The snowfall was normal in both January and February.

UDHAMPUR DISTRICT

Patnitop (Batote) (2033 m.) - Snow fell on twelve days in January, in which there was a spell of eight days from the 24th January. Snow fell on seven days in the first fortnight of February. The total depths in these months were about 90 cm. in each of the months. The mountain ranges and peaks Sansar (2290 m.), Ensin Dhar (2700 m. - 3350 m.), Patnitop (2130 m.), Batote (1680 m.), Kud (1700 m.), Kud peaks (2700 m. - 3350 m.) and Eastern Pir Panjal (4090 m. - 4110 m.), experienced snowfall during both the months. The amounts of snow accumulation at Patnitop were 105 cm. in January and 90 cm. in February. It was reported that as a result of the heavy snowfalls, the Jammu-Srinagar Road was blocked for about eleven days in January.

The snowfall was above normal during the period.

### II. PUNJAB (I) AND HIMACHAL PRADESH

CHAMBA DISTRICT

Pangi

Kilar (Pangi Range) (2564 m.) - Snow fell on nine days in January and twelve days in February, in which period there was a spell of eight days from the 26th January. The total falls in these months were 140 cm. and 137 cm. respectively, the corresponding snow-water amounts (or water equivalent of snow) being 12.0 cm. and 10.7 cm. The maximum fall in January was 41 cm. on the 29th and in February, 30 cm. on the 2nd.

The depths of accumulation of snow on Sach pass (4410 m.) were 4.9 m. in January and 7.6 m. in February.

The snowfall was above normal in January and normal in February.

Churah

Tissa (1570 m.) - The station proper experienced snowfall on four days each in the first and second halves of January and on nine days in the first fortnight of February, the total depths being 66 cm. in January and 2.4 m. in February. The maximum fall during this period was 86 cm. on 7th February.

Tissa Range - Snow fell on nine days in the month of January and also on nine days in the first fortnight of February. The total depths in these months were 60 cm. and 2.4 m. respectively. The heaviest fall in January was 23 cm. on the 30th and in February 86 cm. on the 7th. Snowfall was observed at heights over 1220 m. in January and 910 m. in February. The accumulations of snow on the passes were as under :-

| Name of pass | Accumulation | |
|---|---|---|
| | January | February |
| Sach (4410 m.) | 6.1 m. | 9.1 m. |
| Chehni (4570 m.) | 6.4 m. | 9.8 m. |
| Marali (2740 m.) | 1.8 m. | 2.4 m. |

The snowfall was above normal in January and much above normal in February.

Bhandal Range - In January a total depth of snowfall at Padhri pass (3050 m.) amounting to 9.1 m. was reported, while it was 1.8 m. at the station proper. The same amounts were reported as the accumulations at the end of the month. There were ten snowfalls in February. The depths of snow at Padhri pass, Gamguhal pass (3370 m.) and at the station proper were 7.6 m., 10.4 m., and 2.4 m. respectively. These amounts were also reported as the accumulations at the end of the month.

The crops were covered with snow in January and their condition was reported to be 'not good' at the end of the season.

The snowfall was very much above normal during the period.

Tikri Range - In January there were two occasions of snowfall above elevations of 1070 m., while at higher elevations of 2440 m. and above snowfalls were more frequent. The average depth of snow varied from 3 cm. to 3 m. at heights ranging from 1070 m. and above. Snow accumulation was present throughout the month at heights above 1370 m. The accumulations at Drati pass (4720 m.) and Mehlu pass (3960 m.) were 3.0 m. and 1.8 m. respectively.

(The report for February was not received.)

The snowfall was above normal in January.

Chamba

Chamba (924 m.) - At the station proper no snow fell in January while there were two snowfalls in the first week of February, the depth amounting to 20 cm. The snowfall descended to a height of 1070 m. in January and 910 m. in February. The amounts of snow accumulation on the surrounding passes and peaks were as under :-

| Name of pass/peak | Accumulation | |
|---|---|---|
| | January | February |
| Khajiar | 1.2 m. | 1.8 m. |
| Basodhan pass | 1.2 m. | 1.8 m. |
| Sillagharat | 1.2 m. | 1.8 m. |
| Kainthly hills | 91 cm. | 1.8 m. |

The snowfall in the region was normal during the period.

Bhanota (914 m.) - Snow fell on only one day during the period on 6th February, the amount being 8 cm.

Upper Chamba Range

Chhattrari (1793 m.) - There were three days of snowfall in January and nine days in February out of which there was a spell of ten days from the 30th January. The total depths of snowfall in these months were 1.0 m. and 1.2 m. respectively. The heaviest falls recorded were 74 cm. on 1st January and 30 cm. on 8th February.

The snowfall was above normal during the period.

Lower Chamba Range - There occurred four snowstorms in the last week of January and four in the first fortnight of February. The snowfall was observed at heights of 1340 m. in January and 1070 m. in February. The depths of snow accumulation on well known passes of the range were reported as under :-

| Name of pass/peak | Accumulation | |
|---|---|---|
| | January | February |
| Basodhan | 0.9 m. | 1.2 m. |
| Duga Bhadarwa | 1.3 m. | 1.8 m. |
| Juwali | 1.6 m. | 2.3 m. |

The snowfall was above normal in both the months.

Bhattiyat

Kalatop (Dalhousie Range) (2414 m.) - Snowfall occurred on eleven days in the first and last weeks of January and on another eleven days in the first fortnight of February. The total falls in these months were 2.6 m. and 4.8 m. respectively. The maximum falls were 1.1 m. on 29th January and 89 cm. on 6th February.

Chowari (1021 m.) - No snowfall was experienced at the station proper during the period.

Bhathree (1372 m.) - Snowfall occurred on one day in the last week of January and on five days in the first week of February, the total depths being 5 cm. and 43 cm. respectively.

Bharmaur

Bharmaur (2155 m.) - Snow fell on three days in the first week and five days in the last week of January and on eleven days in the first fortnight and three days in third week of February. The total depths recorded in these months were 1.3 m. and

2.2 m. respectively. Maximum falls of 61 cm. were reported on the 30th January and 2nd February.

MAHASU DISTRICT

Chopal (2342 m.) - It snowed on four days in January viz first two and last two days of the month and on eleven days in the first half of February. The total depths were 1.3 m. and 1.5 m. in January and February respectively. The maximum falls were 53 cm. on 29th January and 58 cm. on 6th February. The snowfall descended to elevations of 760 m. in both the months and the roads were blocked. On the highest peak of Chur Dhar, the depth of snowfall was about 6.1 m. in January and 9.1 m. in February while on other high altitudes at Khirki, Chhattar, Talra, Chhachpur and Mandha Lani, the depths of snow were about 3.7 m. in January and 4.9 m. in February. The same amounts were reported as the accumulations at the end of these months.

The snowfall was above normal in both the months.

Shilaroo (2591 m.) - Snow fell on six days in the first four and last two days of January and on fifteen days in an almost continuous spell in the first three weeks of February. The total falls were 1.1 m. in January and 1.9 m. in February. The maximum falls were 43 cm. on 30th January and 41 cm. on 7th February. The depths of snow accumulation were 1.2 m. in January and 3.1 m. in February. It was reported that the crops were buried under the snow.

The snowfall was above normal in January and much above normal in February.

Phancha (Pandra Bis Range) (2271 m.) - It snowed on three days during the first and four days in the last week of January and on fifteen days in February. There was a spell of twelve days of snowfall upto the 10th February. The depths of snowfall recorded were 1.6 m. and 2.4 m. in these months respectively. The maximum falls were 51 cm. on 30th January and 41 cm. on 1st February. The depths of snow accumulation on Sujroo pass (2900 m.) were 3.0 m. and 4.9 m. at the ends of January and February respectively.

The snowfall was normal in January and above normal in February.

Junga (1939 m.) - There were two occasions of snowfall on the 1st and 30th January and on two occasions in the first fortnight of February. The corresponding depths in these months were 11 cm. and 37 cm.

The snowfall was normal in January and above normal in February.

Rampur (1057 m.) - Snowstorms occurred on five days of which three days were in the beginning and two days at the end of January and on seven days in the first fortnight of February. The snowfalls were experienced at elevations above 910 m. in January and 760 m. in February. In January, the depths of snowfall were 1.4 m. and 1.2 m. on Hatu and Daran Ghati respectively, while in February the depths in these regions ranged from 3.0 m. to 3.4 m. The same amounts were recorded as the accumulations at the ends of the months.

The snowfall was above normal during the period.

Kumarsain (1388 m.) - There were five days of snowfall, two days in the first week and three days in the last week of January and six days in the first week of February. There was a spell of 9 days ending on 6th February. The snowfall occurred at elevations above 760 m. in both the months. The depths of snowfall at Narkanda (2740 m.) were 1.2 m. and 3.7 m. in January and February respectively. The same amounts were reported as the accumulations at the ends of these months.

The snowfall was above normal in January and in February.

Theog (2286 m.) - The total depth of snowfall in January amounted to 1.6 m. No snow fell in February.

The snowfall was above normal in January and below normal in February.

Kotkhai (1676 m.) - About 18 cm. of snow fell on three days in January, of which two days were in the first week and one day in the last week and 1.1 m. in February on thirteen days in the first fortnight at the station proper. The snowfall was reported to have proved useful to the standing crops. The depths of snowfall on the surrounding well known peaks were as under :-

| Name of peak | Depth of snowfall | |
|---|---|---|
| | January | February |
| Naira (2290 m.) | 0.9 m. | 3.7 m. |
| Joshla (2440 m.) | 0.9 m. | 3.7 m. |
| Mundroo (2440 m.) | 0.9 m. | 3.7 m. |
| Khara Pathar (2590 m.) | 0.9 m. | 3.7 m. |
| Bagi (2740 m.) | 0.9 m. | 3.7 m. |

The snowfall was above normal during the period.

Suni (510 m.) - Snow fell on four days in the first and last weeks of January and on nine days in the first half of February including a spell of five days ending 2nd February, the total amounts being 2.6 m. and 4.2 m. respectively. The heaviest falls were 0.9 m. on 1st January and 1.8 m. on 6th February. The lowest heights upto which the snowfall descended was 1070 m. in January and 520 m. in February but by the end of the period the falls occurred at elevations of 1520 m. On the peak of Shali Dhar (3050 m.) the amounts of snow accumulation were 2.0 m. in January and 1.8 m. in February.

The snowfall was normal in January and much above normal in February.

Lower Pabar Range

(i) Bashla (2286 m.) - Snowfall occurred on three days during the first and last weeks of January and on nine days during the first half of February. The depths of snowfall were 10 cm. and 1.5 m. in the respective months. The heaviest fall recorded during the period was 46 cm. on 7th February.

The snowfall was below normal in January and above normal in February.

(ii) Khadrala (2957 m.) - It snowed at Khadrala on eight days of which three days were in first week, one day in the second week, one day in the third week and on the last three days of January and on six days in February of which four days were in the first week and on one day each in the second and third weeks. The corresponding depths of snowfall in these months were 35 cm. and 2.1 m. The maximum fall during the period was 1.1 m. on 2nd February.

The snowfall was below normal in January and above normal in February.

Rohru (1524 m.) - Snow fell on three days (on the second and last two days) of January and on five days during the first fortnight of February, the respective amounts in these months being 42 cm. and 80 cm. The amounts of snow accumulation on some well known passes in the region were as under :-

| Name of pass | Accumulation | |
|---|---|---|
| | January | February |
| Khadrala | 1.2 m. | 3.7 m. |
| Sungri | 1.2 m. | 3.7 m. |
| Chansal | 2.1 m. | 5.5 m. |

The snowfall was above normal in both the months.

Arki (1219 m.) - Snowfall was experienced on the hilly regions on the last two days of January and on the 7th and 8th February. The depths of snowfall were as under :-

| Name of place | Depth of snowfall | |
|---|---|---|
| | January | February |
| Arki (1220 m.) | Nil | 5 cm. |
| Bari Dhar hills (2070 m.) | 46 cm. | 1.1 m. |
| Kamaghoo pass (1650 m.) | 15 cm. | 46 cm. |

The snowfall was normal in January and above normal in February.

Solan (1530 m.) - Snowfall occurred on the 29th January and on the 6th February during the period, and the depths were 3 cm. and 15 cm. respectively. The nearby peak Karol was reported to have received 5 cm. to 8 cm. snowfall in January and 30 cm. to 60 cm. in February.

The snowfall was below normal in January and normal in February.

Jubbal (1891 m.) - There was one snowfall and one snowstorm on the 1st and 30th January respectively while there was a spell of snowfall and snowstorms for seven days in the first week of February. The total depths of snowfall in the respective months were 56 cm. and 1.3 m. The heaviest fall reported was 46 cm. on 30th January. The amounts of snow accumulation in January and February were 46 cm. and 1.8 m. respectively at the station proper and 1.5 m. and 3.7 m. respectively at Chambi Kupar (3350 m.), the highest peak in the Tehsil.

The snowfall was normal in January and above normal in February.

Jubbal Forest Division - Scattered snowfalls occurred at elevations above 760 m.on 4 days on the first and last three days of January and in two spells lasting several days in February. The total depths of snowfall and the maximum depth reported in one day at some important places are given below :-

| Name of place | Depth of snowfall | | | |
|---|---|---|---|---|
| | January | | February | |
| | Total | Maximum | Total | Maximum |
| Khirki (2440 m.) | 1.4 m. | 1.4 m. | 1.8 m. | - |
| Bhog (2130 m.) | 97 cm. | 33 cm. | 2.1 m. | - |
| Deya (2230 m.) | 1.0 m. | 35 cm. | 4.9 m. | - |
| Nerwa (1140 m.) | 15 cm. | 10 cm. | - | - |
| Sarain (2210 m.) | 1.8 m. | 1.5 m. | 4.4 m. | - |
| Mandha Ghati (2500 m) | 2.7 m. | 2.1 m. | 6.1 m. | - |
| Neoti (1550 m.) | 30 cm. | 30 cm. | - | - |
| Chhachpur (2110 m.) | 84 cm. | 61 cm. | 1.5 m. | - |
| Ori pass (2680 m.) | 60 cm. | 60 cm. | 1.5 m. | - |
| Bharach (3080 m.) | 1.5 m | 90 cm. | 1.8 m. | - |
| Banah (2130 m.) | 1.4 m. | 1.4 m. | 2.1 m. | - |
| Kanda (2130 m.) | 1.2 m. | 84 cm. | - | - |
| Manalog (2530 m.) | 1.8 m. | 1.1 m. | 2.7 m. | - |
| Lutkhari (2440 m.) | 1.5 m. | 90 cm. | - | - |

| Name of place | Depth of snowfall | | | |
|---|---|---|---|---|
| | January | | February | |
| | Total | Maximum | Total | Maximum |
| Reoshti (2290 m.) | 1.1 m. | 60 cm. | - | - |
| Bhalu (1890 m.) | 45 cm. | 30 cm. | - | - |
| Tharoach (2080 m.) | - | - | 1.9 m. | - |
| Halan (2100 m.) | - | - | 2.2 m. | - |

The amounts of snow accumulations at the ends of January and February were as under :-

| Name of place | Accumulation | |
|---|---|---|
| | January | February |
| Talra (3220 m.) | 2.4 m. | 4.3 m. |
| Kanali Thach (2590 m.) | 2.0 m. | 4.0 m. |
| Mandha Ghati (2500 m.) | 2.1 m. | 3.0 m. |
| Bhog Dhar (2290 m.) | 1.8 m. | 3.4 m. |
| Banah (2130 m.) | 1.4 m. | 2.1 m. |
| Manalog (2530 m.) | 1.8 m. | 2.7 m. |
| Lutkhari (2440 m.) | 1.5 m. | 2.4 m. |
| Bharach (3080 m.) | 1.5 m. | 1.8 m. |
| Sarain (2210 m.) | - | 2.4 m. |

The snowfall was above normal during the period.

Kasumpti (1989 m.) - Snowfall was experienced in both January and February, the respective amounts being 70 cm. and 1.1 m.

KINNAUR DISTRICT

Kilba-Kailash Range

(i) Kilba (1829 m.) - Snow fell on seven days during the first and last weeks of January, the total depth amounting to 94 cm. In February snowfall amounting to 70 cm. was recorded.

The snowfall was normal in January and above normal in February.

(ii) Sangla (2591 m.) - There were ten days of snowfall during January mostly in the second fortnight. The total depth of snowfall amounted to 1.1 m. The depth of snowfall reported during February was 1.2 m.

The snowfall was normal in January and above normal in February.

(iii) Purbani (2286 m.) - Snowfall occurred on ten days mostly during the latter half of January and snowfall was also reported during February. The respective depths in these months were 1.3 m. and 1.4 m.

The snowfall was normal in January and above normal in February.

Chini (2774 m.) - The total depths of snowfall during January and February were 1.2 m. and 1.6 m. respectively.

The snowfall was above normal during the period.

Kalpa - The total depths of snowfall during January and February were 1.3 m. and 1.4 m. respectively.

KANGRA DISTRICT

Banjar (Inner Seraj Sub-Tehsil) (640 m.) - There was good snowfall on the high peaks of the region both in January and February. There were heavy snowfalls in the whole of the Tehsil on two days in January and on thirteen days in February in which month the total depth of snowfall amounted to 53 cm.

The depths of snowfall and the accumulations at the ends of the months on the well known peaks in the region were as under :-

| Name of peak | Depth of snowfall | | Accumulation | |
|---|---|---|---|---|
| | January | February | January | February |
| Raghopur | 2.7 m. | 3.0 m. | 3.7 m. | 3.7 m. |
| Jalori | 2.7 m. | 3.0 m. | 3.7 m. | 3.7 m. |
| Sakirn | 2.1 m. | 2.4 m. | 3.4 m. | 3.0 m. |
| Lambri | 2.6 m. | 2.7 m. | 4.0 m. | 4.0 m. |
| Shepakaru | 2.3 m. | 3.4 m. | 4.6 m. | 6.7 m. |
| Gargarasan | 2.6 m. | 3.7 m. | 4.9 m. | 7.0 m. |
| Bashelu | 2.4 m. | 2.7 m. | 4.0 m. | 4.0 m. |
| Pallach | 2.4 m. | 2.7 m. | 4.0 m. | 4.0 m. |
| Tirth | 2.1 m. | 3.0 m. | 4.3 m. | 6.4 m. |

The snowfall was normal in January and above normal in February.

Nirmand (Outer Seraj Sub-Tehsil) (1218 m.) - Snowfall occurred on six days in the first and last weeks of January and the snowfalls descended to an elevation of 1220 m. The depths of snowfall and the snow accumulation on some well known peaks during January and February are given below :-

| Name of peak | Depth of snowfall | | Accumulation | |
|---|---|---|---|---|
| | January | February | January | February |
| Sirikhand | 3.0 m. | 4.6 m. | 7.6 m. | 10.7 m. |
| Chol | 1.5 m. | 2.4 m. | 2.4 m. | 3.0 m. |
| Maghan | 1.2 m. | 2.0 m. | 2.0 m. | 2.1 m. |
| Dundku | 1.2 m. | 2.0 m. | 2.0 m. | 2.1 m. |
| Shikar | 0.9 m. | 1.2 m. | 1.2 m. | 1.2 m. |
| Ramgarh | 0.6 m. | 1.2 m. | 0.5 m. | 0.6 m. |
| Nohun | 0.6 m. | 1.2 m. | 0.6 m. | 0.9 m. |

The snowfall was above normal in January and much above normal in February.

MANDI DISTRICT

Mandi Forest Division - The depths of snowfall on some of the well known peaks in January and February were as under :-

| Name of peak | Depth of snowfall | |
|---|---|---|
| | January | February |
| Tunga Devi (3050 m) | 2.1 m. | 3.0 m. |
| Prasar Dhar(2740 m) | 1.8 m. | 2.4 m. |
| Shikari (3350 m.) | 2.9 m. | 4.3 m. |
| Kamru Nag (3050 m.) | 2.3 m. | 2.7 m. |

The same amounts were reported as the accumulations at the end of the respective months.

The snowfall was above normal in January and much above normal in February.

## III - UTTAR PRADESH

TEHRI GARHWAL DISTRICT :- There was only one heavy snowfall at heights above 910 m. on the 29th January. The depths of snow were reported to be 30 cm. and above, varying with the heights of the district. The well known higher passes Dhanolti, Surkanda, Nagtiba, Kanda and Patti Nagun were covered with snow. In February there was a severe snowfall during the week ending 15th February on the ridges and peaks above 2740 m. The depth of snowfall was 1.4 m. on the peaks of Surkanda in Patti Bamund. A cold wave passed through the region during the snowfall.

The snowfall was normal in January and above normal in February.

GARHWAL DISTRICT :- Five snowfalls occurred in two spells in the first and last weeks of January. The first spell of two days was confined to heights above 2130 m. and the depth of snow varied from 5 cm. to 18 cm. During the second spell the snowfall descended to the lower inhabited regions and the depths varied from 3 cm. to 6 cm. in the inhabited areas and from 10 cm. to 61 cm. on higher regions. There were eight snowfalls in February of which six were in the first week and two in the second week. The depths of snow during the first two falls were 3 cm. to 15 cm. in the inhabited areas and 10 cm. to 61 cm. on the high peaks; the snowfall during the next four falls amounted to 3 cm. to 10 cm. in the inhabited areas and 1.2 m. to 1.5 m. on the high peaks. In the last two falls, the corresponding amounts in these regions were 3 cm. to 8 cm. and 3 cm. to 15 cm. respectively. The depths of snow accumulation varied from 3 cm. to 15 cm. in the villages and 10 cm. to 61 cm. on the high peaks in January and the corresponding amounts at the end of February were 3 cm. to 15 cm. and 3 cm. to 1.5 m.

The snowfall was above normal during the period.

ALMORA DISTRICT :- The total depths of snowfall and the accumulations at the ends of the months on the well known high peaks of Malla Danpur were as under :-

| Name of peak | Depth of snowfall | | Accumulation | |
|---|---|---|---|---|
| | January | February | January | February |
| Kautela | 60 cm. | 1.5 m. | 1.4 m. | 2.1 m. |
| Kafini | 90 cm. | 1.2 m. | 2.1 m. | 2.4 m. |
| Bankatia | 1.1 m. | 1.5 m. | 4.0 m. | 4.3 m. |
| Pindar | 1.8 m. | 2.3 m. | 3.0 m. | 4.0 m. |
| Nanda Devi | 2.3 m. | 2.9 m. | 3.8 m. | 4.0 m. |
| Sundardhunga | 2.0 m. | 2.4 m. | 3.2 m. | 3.4 m. |

The snowfall was above normal in both the months.

NAINITAL DISTRICT :

Mukteswar (2310 m.) - It snowed on seven days during the first and last weeks of January. On only two occasions (on the 3rd and 30th) the snowfall extended to the surrounding high peaks of Ramgarh, Gagarh etc. and the depth of snow amounted to 17 cm. The remaining snowfalls were of light intensity and were confined to the station only. Light to moderate snow fell on eight days in February during the first fortnight, the depth of snow being about 28 cm. The snowfall extended to all the surrounding high peaks and on one occasion (on 7th February) also des-

cended to the lower valleys.

The snowfall was normal during the period.

Hot Weather / Pre-monsoon period - March to May

## I. JAMMU AND KASHMIR

### NORTH BARAMULLAH DISTRICT

Gulmarg (2652 m.) - Reports for March and April were not received.

Snowfall and snow accumulation on the well known peaks such as Apharwat and Handibal were above normal in May.

### SOUTH ANANTNAG DISTRICT

Srinagar (1585 m.) - In March, two snowfalls were experienced at the station. The snowfall on one of these days viz. on the 24th March was quite heavy. The total precipitation recorded was 7.6 cm. Snowfall occurred more than twice on the adjoining peaks and a thick layer of snow was visible on them.

In April, there were no snowfalls at the station proper or in the valley but the surrounding peaks experienced snowfall on two or three occasions. The amount of snow accumulation on the peaks at the end of April could not be estimated. In May no snowfall was experienced in the valley or on the surrounding peaks. The snow accumulations on the Zojilla pass and Apharwat peak were reported to be more than normal. Moreover, the snowline was visible on other lower peaks which normally do not have any accumulation at this time of the year. The amount of accumulation of snow was above normal at the end of the season.

The snowfall was above normal in March and normal in April and May.

### UDHAMPUR DISTRICT

Patnitop (Batote) (2033 m.) - In March snow fell once on the high peaks of the ranges of Pir Panjal (4090 m. - 4110 m.), Ensin Dhar (2700 m. - 3350 m.) and Kud (2700 m. - 3350 m.). Accumulation of snow was present at heights of 2130 m. Two snowfalls were observed in the first fortnight of April on the high peaks of the Eastern Pir Panjal range. Snow accumulation was visible on the high peaks at the end of the month. In May snowfall was observed on the 15th on the high peaks of Pir Panjal range above 3350 m. and the accumulation at the end of the month was confined to this height.

The accumulation of snow at the end of the season was above normal.

### LADAKH DISTRICT

Kargil (2679 m.) - Reports for March and April were not received.

No snow fell at the station in May. Accumulation of snow amounting to 60 cm. was present on Naktul only.

Sonamarg (2515 m.) - Reports for March and April were not received.

No snow fell at the station in May.

Dras (3066 m.) - Reports for March and April were not received.

There was no snowfall at the station in May. The snow accumulation on the surrounding mountain ranges was 60 cm. The snowfall was reported to be normal this year.

Leh (3514 m.) - Reports for March and April were not received.

The region experienced about 30 cm. snowfall in May at heights above 4300 m. Accumulation of snow amounting to about 1.2 m. was present at high eleva-

tions of about 5500 m. to 6000 m.

The snowfall was normal in May.

## II. PUNJAB (I) AND HIMACHAL PRADESH

### CHAMBA DISTRICT

#### Pangi

Kilar (Pangi Range) (2564 m.) - The station proper experienced snowfall on five days in the first fortnight and on four days in the second fortnight of March. The total depth of snow recorded was 1.2 m. while the heaviest fall was 46 cm. on the 22nd March. The snowfalls extended over the whole of Pangi valley and the accumulation of snow at the end of the month on Sach pass (4410 m.) was 6.1 m. The report for April was not received. In May, the depth of snowfall on the high peaks of the range was 60 cm. and the accumulation at the end of the month was upto 3.0 m. on the well known passes.

The snowfall was above normal in March and normal in May.

#### Churah

Tissa (1570 m.) - There was no snowfall during the season March to May at the station proper.

Tissa Range - In March there were four snowfalls and on each occasion the height of occurrence of snowfall descended from 2290 m. to 1980 m. Four snowstorms were experienced in the first half of April. The first two snowfalls descended to the lower ranges upto 1980 m. while the last two were confined to the high peaks of the range.

The amounts of snow accumulation at the end of each of the months March and April were as under :-

| Name of pass | Accumulation | |
|---|---|---|
| | March | April |
| Sach (4410 m.) | 7.6 m. | 6.1 m. |
| Chehni (4570 m.) | 8.2 m. | 6.7 m. |
| Marali (2740 m.) | 1.5 m. | 0.5 m. |

The report for May was not received.

The snowfall was above normal in March and April.

Bhandal (1730 m.) - No snow fell at the station proper during the season.

Bhandal Range :- During this season slight snowfall was experienced in March at heights above 1830 m. The amounts of snow accumulation on Padhri pass at the ends of March, April and May decreased to 90 cm., 20 cm., and 15 cm. respectively.

The snowfall was below normal during the period.

Tikri Range :- Snowfall was observed on three occasions in March at heights above 2130 m. in the interior ranges. The falls were more frequent at elevations of more than 2740 m. The total depths during the month varied from 3 cm. at the lower levels to 1.2 m. at the higher ranges. In April, snowfall occurred twice at heights above 2740 m. and more frequently at heights above 3960 m. The depths of snow varied from 8 cm. to 60 cm. according to the elevations. The amounts of snow accumulation at the ends of March and April were reported as under :-

| Name of pass/peak | Accumulation | |
|---|---|---|
| | March | April |
| Drati (4720 m.) | 1.2 m. | 60 cm. |
| Chaurasi (4570 m.) | 90 cm. | 46 cm. |
| Mehlu (3960 m.) | 60 cm. | 23 cm. |

The report for May was not received.

The snowfall was normal during March and April.

Chamba

Chamba (924 m.) - No snowfall was experienced at the station proper during the period. The snowfall descended to 1980 m. in March, 3660 m. in April and 4270 m. in May. The amounts of snow accumulation of some well known passes in the range at the end of each month were reported as under :-

| Name of pass/peak | Accumulation | | |
|---|---|---|---|
| | March | April | May |
| Sach | 4.3 m. | 2.1 m. | 60 cm. |
| Padhri | 3.7 m. | - | - |
| Kalichho | 5.5 m. | - | 1.2 m. |
| Basodhan | 60 cm. | - | - |
| Kainthly hills | 60 cm. | - | - |

Ludrera (924 m.) - No snow fell during the period.

Bhanota (914 m.) - No snow fell during the period.

Upper Chamba Range :

Chhattrari (1793 m.) - No snowfall was experienced at the station proper during the period.

Bhattiyat

Kalatop (Dalhousie Range) (2414 m.) - The station experienced snowfall on four days in the second fortnight of March, in which there was a spell of three days from 23rd to 25th. The total depth of snow amounted to 14 cm. No snow fell in April and May. The amount of snow accumulation at the end of the period on the well known peaks of the range was about 1.0 m. The accumulation was reported to be normal.

Chowari (1021 m.) - No snowfall was experienced at the station proper during the period.

Bathree (1372 m.) - No snowfall was experienced at the station proper during the period.

Bharmaur :

Bharmaur (2155 m.) - Snowfall occurred on only one day during the period on 24th March, the amount being 5 cm.

The snowfall in March was below normal.

MAHASU DISTRICT

Chopal (2342 m.) - No snow fell during the period.

Phancha (Pandra Bis Range) (2271 m.) - Snowfall occurred on two days in the second fortnight of March, the total depth being 5 cm. The amount of snow accumulation on Sujroo pass (2900 m.) at the end of March was about 1.5 m.

The reports for April and May were not received.

The snowfall was normal during March.

Junga((1989 m.) - No snow fell during the period.

Rampur (1057 m.) - No snow fell during the period.

Kumarsain (1388 m.) - Snowfall was experienced on 18th and 19th March at elevations above 2440 m. The depth of snowfall at Narkanda was 2.4 m. and the same amount was reported as the accumulation at the end of March. No snow fell in April and May.

The snowfall was above normal in March and normal in April.

Kotkhai (1676 m.) - No snow fell during the period.

Suni (510 m.) - Snow fell once during the period on the 24th March at elevations above 2440 m., the depth being about 8 cm. The depth of snow accumulation on Shali Dhar was 1.2 m. at the end of March.

The snowfall was normal in March.

Lower Pabar Range :

(i) Bashla (2286 m.) - No snow fell at the station proper during the period.

(ii) Khadrala (2957 m.) - Snow fell on two days in March at the station proper, the depth amounting to 15 cm. on the 19th and 20th March. In April snow fell on the 15th, the depth being 6 cm. No snow fell in May.

The snowfall was below normal in March and normal in April and May for both the stations.

Rohru (1524 m.) - No snow fell during the period.

Arki (1219 m.) - No snow fell in March. The reports for April and May were not received.

Solan (1530 m.) - No snow fell during the period.

Jubbal (1891 m.) - No snow fell during the period.

Kasumpti (1989 m.) - No snow fell during the period.

KINNAUR DISTRICT

Kilba - Kailash Range :

(i) Kilba (1829 m.) - No snow fell during the period.

(ii) Sangla (2591 m.) - The station experienced snowfall of 24 cm. and 10 cm. in March and April respectively. No snow fell in May.

The snowfall was below normal during the period.

(iii) Purbani (2286 m.) - The station reported the total depths of snowfall during March as 20 cm. and April as 8 cm. No snowfall occurred during May.

The snowfall was below normal in March and April.

Chini (2774 m.) - Snowfall was experienced during March and April only; the total depths in these months were 22 cm. and 15 cm. respectively.

The snowfall was below normal during the period.

Kalpa - Snowfall occurred in April only, the depth being 15 cm.

Snowfall was below normal during the period.

KANGRA DISTRICT :

Banjar (Inner Seraj Sub-Tehsil) (640 m.) - The depths of snowfall on the well known peaks of the region were reported as under :-

| Name of peak | Depth of snowfall | |
|---|---|---|
| | March | April |
| Raghopur | 30 cm. | - |
| Jalori | 30 cm. | - |
| Sakirn | 30 cm. | - |
| Lambri | 30 cm. | - |
| Shepakaru | 45 cm. | - |
| Gargarasan | 45 cm. | - |
| Bashelu | 30 cm. | - |
| Pallach | 30 cm. | - |
| Tirth | 45 cm. | - |

The report for May was not received.

Nirmand (Outer Seraj Sub.-Tehsil) (1218 m.) - The following table gives the depths of snowfall and the accumulations on the well known peaks in this sub-tehsil :-

| Name of peak | March | April | May |
|---|---|---|---|
| SNOWFALL | | | |
| Sirikhand | 1.8 m. | 90 cm. | 60 cm. |
| Chol | 60 cm. | 30 cm. | - |
| Maghan | 60 cm. | 30 cm. | - |
| Dundku | 60 cm. | 30 cm. | - |
| Shakar | 30 cm. | 30 cm. | - |
| Nohun | 30 cm. | - | - |
| ACCUMULATION | | | |
| Sirikhand | 11.0 m. | 9.1 m. | 6.7 m. |
| Chol | 1.8 m. | 60 cm. | - |
| Maghan | 90 cm. | 30 cm. | - |
| Dundku | 90 cm. | 30 cm. | - |
| Shakar | 30 cm. | - | - |
| Nohun | 30 cm. | - | - |

The snowfall was normal during the period.

MANDI DISTRICT

Mandi Forest Division :- No snowfall was experienced during the period. The amounts of snow accumulation on some well known peaks were as under :-

| Name of peak | Accumulation | | |
|---|---|---|---|
| | March | April | May. |
| Tunga Devi (3050 m) | 90 cm. | - | - |
| Prasar Dhar (2740 m.) | 90 cm. | - | - |
| Shikari (3350 m.) | 1.5 m. | - | - |

| Name of peak | Accumulation | | |
|---|---|---|---|
| | March | April | May |
| Kamru Nag(3050 m.) | 1.1 m. | - | - |
| Nargu (3960 m.) | * | * | 60 cm. |

* No report received.

The snowfall was above normal in March.

Suket Forest Division - The reports for March and April were not received. There was no snowfall or any snow accumulation in the region during May.

## III - UTTAR PRADESH

TEHRI GARHWAL DISTRICT - There was no snowfall during the period.

GARHWAL DISTRICT - There was no snowfall during the period.

ALMORA DISTRICT - The total depths of snowfall and the amounts of snow accumulation at the end of each of the months on the well known high peaks of Malla Danpur were reported as under :-

| Name of peak | March | April | May |
|---|---|---|---|
| SNOWFALL | | | |
| Kautela | 45 cm. | 1.5 m. | - |
| Kafini | 75 cm. | 2.1 m. | - |
| Bankatia | 1.2 m. | 2.7 m. | 8 cm. |
| Pindar | 1.5 m. | 3.4 m. | 10 cm. |
| Nanda Devi | 1.7 m. | 3.7 m. | 13 cm. |
| Sundardhunga | 1.4 m. | 3.0 m. | 5 cm. |
| ACCUMULATION | | | |
| Kautela | 2.0 m. | 1.8 m. | 90 cm. |
| Kafini | 2.9 m. | 30 cm. | 60 cm. |
| Bankatia | 3.7 m. | 45 cm. | 1.2 m. |
| Pindar | 4.7 m. | 60 cm. | 1.2 m. |
| Nanda Devi | 4.4 m. | 90 cm. | 2.1 m. |
| Sundardhunga | 3.5 m. | 1.2 m. | 1.5 m. |

The snowfall was normal in March, above normal in April and below normal in May.

NAINITAL DISTRICT

Mukteswar (2310 m.) - No snowfall occurred at the station during the period.

## Southwest Monsoon Period - June to September

### June - July

### I. JAMMU AND KASHMIR

NORTH BARAMULLAH DISTRICT

Gulmarg (2652 m.) - In June, five snowfalls were observed on Handibal and Apharwat mountains, the snowfall occurring towards the middle and end of the month. No snow fell in July. The accumulations on these mountains were normal in June and below normal in July.

SOUTH ANANTNAG DISTRICT

Srinagar (1585 m.) - There were no snowfalls in the valley in June and July. Slight snow accumulation was visible on the surrounding peaks and passes at the ends of both the months.

UDHAMPUR DISTRICT

Patnitop (Batote) (2033 m.) - No snow fell in both June and July. The small amount of snow accumulation which was present on the Pir Panjal ranges at elevations of 4100 m. in June melted by the end of July.

LADAKH DISTRICT

Leh (3514 m.) - The report for June was not received.

There was no occurrence of snowfall in July. Accumulation of snow amounting to 30 cm. was present on the passes at elevations of 5500 m. to 6100 m.

The snowfall was below normal in July.

## II. PUNJAB (I) AND HIMACHAL PRADESH

CHAMBA DISTRICT

Churah

Bhandal Range :- No snow fell in June. The report for July was not received.

Lower Chamba Range :- No snow fell in June and July. There was no accumulation of snow on the range, except in the ravines.

Bhattiyat :

Trehta Range :- Snowfall was experienced in June on the higher passes of the range, Jalsu (3810 m.) and Kwarsi (4420 m.) recording 60 cm. and 1.5 m. respectively. No snow fell in July.

MAHASU DISTRICT :- No snowfall was reported during both the months at Chopal (2342 m.), Junga (1989 m.), Rampur (1067 m.), Kumarsain (1388 m.), Theog (2286 m.), Kotkhai (1676 m.), Suni (510 m.), Bashla (2286 m.) and Khadrala (2957 m.) in Lower Pabar Range, Rohru (1524 m.), Solan (1530 m.), Jubbal (1891 m.) and Kasumpti (1989 m.).

KINNAUR DISTRICT :- No snowfalls were reported during the period by the stations Kilba (1829 m.), Sangla (2591 m.) and Purbani (2286 m.) in Kilba - Kailash Range, Chini (2774 m.) and Kalpa.

MANDI DISTRICT :

Mandi Forest Division :- No snowfall was experienced and no accumulation was present on the well known passes of the region during June and July.

## III. UTTAR PRADESH

TEHRI GARHWAL DISTRICT :- There was no snowfall during the period.

GARHWAL DISTRICT :- There was no snowfall during the period.

ALMORA DISTRICT :- The total depths of snowfall and the amounts of snow accumulation on the well known peaks of Malla Danpur were reported as under :-

| Name of peak | Depth of snow | | Accumulation | |
|---|---|---|---|---|
| | June | July | June | July |
| Kautela | - | - | 30 cm. | 8 cm. |
| Kafini | - | 0 | 60 cm. | 20 cm. |
| Bankatia | 8 cm. | 0 | 90 cm. | 60 cm. |

| Name of peak | Depth of snow | | Accumulation | |
|---|---|---|---|---|
| | June | July | June | July |
| Pindar | 10 cm. | 0 | 60 cm. | 45 cm. |
| Nanda Devi | 13 cm. | 0 | 1.2 m. | 75 cm. |
| Sundardhunga | 5 cm. | 0 | 90 cm. | 45 cm. |

The snowfall was normal in June and below normal in July.

NAINITAL DISTRICT :

Mukteswar (2310 m.) - No snow fell during June and July.

August - September

I. JAMMU & KASHMIR

NORTH BARAMULLAH DISTRICT

Gulmarg (2652 m.) - During the period, one snowfall was observed on 20th August on the peaks of Handibal mountains. A small amount of snow accumulation was present in both the months on Handibal and Apharwat mountains.

The snowfall was normal in August and below normal in September.

SOUTH ANANTNAG DISTRICT :

Srinagar (1585 m.) - No snowfall occurred at the station during the period. One snowfall was experienced on the peaks and ranges above 3000 m. on the 30th September. Slight snow accumulation was present on Zojilla pass and Apharwat peak at the end of August.

UDHAMPUR DISTRICT

Patnitop (Batote) (2033 m.) - There was no snowfall or snow accumulation in August. On the last day of September snowfall occurred on the surrounding mountains and peaks such as Eastern Pir Panjal, Ensin Dhar, Sansar and Kud.

LADAKH DISTRICT :

Leh (3514 m.) - No snow fell during the period. About 30 cm. snow accumulation was present at elevations of 6100 m. at the end of August. Accumulations were observed at elevations above 5500 m. at the end of September.

II. PUNJAB (I) AND HIMACHAL PRADESH)

CHAMBA DISTRICT

Churah

Bhandal Range :- No snow fell during August.

The report for September was not received.

Tikri Range :- No report was received for August. Snowfall was observed on two days in September on the inner peaks of the Himalayas above 4570 m. The depth of snow varied from 5 cm. to 15 cm. The occurrences of snowfall on these peaks were reported to be early. The amounts of snow accumulation at the end of September on the peaks of Drati and Chaurasi above 4570 m. were 8 cm. and 5 cm. respectively.

Chamba

Lower Chamba Range :- No snow fell during August. There was no accumulation of snow except in some of the ravines of Juwali and Duga Bhadarwa.

The report for September was not received.

MAHASU DISTRICT :- No snow fell during the period at Chopal (2342 m.), Junga (1989 m.), Rampur (1067 m.), Kumarsain (1388 m.), Theog (2286 m.), Kotkhai (1676 m.), Suni (510 m.), Bashla (2286 m.) and Khadrala (2957 m.) in Lower Pabar Range, Solan (1530 m.), Jubbal (1891 m.) and Kasumpti (1989 m.)

KINNAUR DISTRICT :- During the period there were no snowfalls experienced at the stations Kilba (1829 m.), Sangla (2591 m.) and Purbani (2286 m.) in Kilba-Kailash Range, Chini (2774 m.) and Kalpa.

MANDI DISTRICT :- The report for August was not received. There were no snowfalls and no accumulation of snow in the district during September.

III - UTTAR PRADESH

TEHRI-GARHWAL DISTRICT :- No snowfall was reported during the period.

GARHWAL DISTRICT :- No snowfall was reported during the period.

ALMORA DISTRICT :- Very slight snowfall occurred on the peaks of Malla Danpur during August and September. The amounts of snow accumulation on the well known peaks at the ends of August and September were reported as under :-

| Name of peak | Accumulation | |
|---|---|---|
| | August | September |
| Kautela | 5 cm. | 0 cm. |
| Kafini | 15 cm. | 15 cm. |
| Bankatia | 45 cm. | 45 cm. |
| Pindar | 45 cm. | 45 cm. |
| Nanda Devi | 60 cm. | 60 cm. |
| Sundardhunga | 30 cm. | 30 cm. |

The snowfall was below normal during the period.

NAINITAL DISTRICT :

Mukteswar (2310 m.) - No snowfall was reported during August and September.

Post Monsoon Period - October to December

I. JAMMU AND KASHMIR

SOUTH ANANTNAG DISTRICT

Srinagar (1585 m.) - In October no snowfall occurred at the station, however, snowfall was experienced on three occasions on all the surrounding peaks, ranges and passes. The station witnessed the first snowfall since March on the 27th November, the depth of snow being about 2 cm. In December slight to moderate snowfalls were observed on the surrounding hills and in the valley on the 16th, 17th, 30th and 31st of the month. A thick layer of snow was visible on the surrounding peaks in November and December.

Snowfall was below normal during the period.

UDHAMPUR DISTRICT

Patnitop (Batote) (2033 m.) - Snowfall was observed on 31st October, 16th and 27th November and on the 16th December. The snowfall descended to elevations of 2290 m. in October and 1570 m. in November and December. The surrounding peaks and ranges such as Eastern Pir Panjal (4090 m.)- 4110 m.), Ensin Dhar (2700 m. - 3350 m.), Kud peaks, Sansar (2290 m.), Patnitop (2130 m.), Kud (2700 m. - 3350 m.) and Batote (1680 m.) experienced snowfall during the period. Accumulation of snow was confined

to the peaks in October but lowered to Patnitop and the surrounding ranges in November and December. The amount of snow accumulation at Patnitop was 60 cm. at the end of the period.

The snowfall was about normal in October and below normal in November and December.

LADAKH DISTRICT

Kargil (2679 m.) - The report for October was not received. The first two snowfalls were experienced on the 15th and 24th November, the total depth being 9 cm. No snow fell at the station proper in December. The amount of snow accumulation at the end of November on Naktul and Hurker peaks was 30 cm. and 10 cm. respectively. The accumulation of snow at the end of December on Naktul and Hurker passes was reported to be 90 cm. and 10 cm. respectively.

Leh (3514 m.) - The first snowfall at the station occurred on the 30th-31st October, the depth of snowfall on the high elevations above 5490 m. being 10 cm. There were two days of snowfall in the last week of November and three days in the middle of December, the respective total depths in these months being 10 cm. and 20 cm. The corresponding depths of snow accumulation on the mountain ranges (5490 m. to 6100 m.) were 10 cm. in October, 15 cm. in November and 60 cm. in December.

The snowfall was above normal during the period.

Khangral - The report for October was not received. There were five snowfalls in November, of which three were in the last week, and four snowfalls in the second half of December.

## II. PUNJAB (I) AND HIMACHAL PRADESH

CHAMBA DISTRICT

Churah

Tissa Range - The first snowfall of the season occurred on the 13th and 14th October at heights above 3050 m., the total depth of snow being 45 cm. Places above 3050 m. again received snowfall amounting to 23 cm. in the last week of the month. The lower elevations (2290 m.) experienced snowfall on the last two days of October, the depth of snow being about 4 cm. In November, there were three days of snowfall, of which two were in the third week and one in the last week of the month. The snowfalls descended to 1680 m. and the depths were about 5 cm. on each occasion. There were five days of snowfall in December, in which four days were towards the middle of the month. The lowest level to which the snowfall descended was 1310 m. on the 17th December. The depths of snowfall during each fall varied from 5 cm. to 23 cm., Tissa recording 20 cm. during the month. The snowfall was reported to be early during the period.

The accumulations of snow on the well known passes at the end of each month are given below :-

| Name of pass | Accumulation | | |
|---|---|---|---|
| | October | November | December |
| Sach (4410 m.) | 1.8 m. | 3.0 m. | 4.6 m. |
| Chehni (4570 m.) | 1.8 m. | 3.4 m. | 3.7 m. |
| Marali (2740 m.) | 23 cm. | 45 cm. | 60 cm. |

The snowfall was above normal during the period.

Bhandal Range :- No snow fell in October. There were snowfalls in the first fortnight of November and in the second week of December. The amounts of snow accumulation on Padhri pass at the end of November and December were 1.8 m. and 3.6 m. respectively.

Tikri Range :- Snowfall occurred twice in October at heights above 2440 m. The snowfalls were reported to have been experienced earlier than usual for elevations of 2440 m. The amounts of snow accumulation at heights above 2740 m. varied from 8 cm. to 38 cm., the amounts at Drati and Chaurasi passes being 23 cm. and 38 cm. respectively. The reports for November and December were not received.

The snowfall was above normal in October.

Chamba

Upper Chamba Range :

Chhattrari (1793 m.) - There were no snowfalls at the station proper in October and November. Snowfalls were experienced in these months at heights of 2440 m. and 1830 m. - 4270 m. respectively. The corresponding depths of snowfall were 30 cm. and 8 cm. to 46 cm. The snowfalls were reported to have been earlier this year. The accumulation on the well known passes at the end of November was about 45 cm. The report for December was not received.

The snowfall was above normal in October and November.

Bhattiyat

Kalatop (Dalhousie Range) (2414 m.) - There were two days of snowfall in the last week of October, the depth of snowfall at Kalatop amounting to 10 cm. In November snowfall occurred on four occasions, the total depth being 34 cm. Kalatop and South Galla experienced snowstorms on the 16th and 17th December, the respective total depths of snowfall amounting to 1,0 m. and 23 cm. The snowfalls descended to elevations of 2290 m. in October, 2440 m. in November and 1370 m. in December. The snowfalls were reported to have been earlier this year. The accumulation of snow at the ends of the months are given below :-

| Name of peak | Accumulation | | |
|---|---|---|---|
| | October | November | December |
| Kalatop | 10 cm. | - | 1.0 m. |
| Laker Mandi | 15 cm. | - | 1.2 m. |
| Den Kud | - | 53 cm. | - |

The snowfall was above normal during the period.

Trehta Range :- In October, four snowfalls were experienced, the first two falls on the 13th and 14th descended on the peaks of Dhaula Dhar upto 3660 m. During the remaining two falls on the last two days of the month the snowfalls extended to lower levels upto Chanota village (2130 m.). The depths of snow at Jalsu pass and Kwarsi pass were 1.7 m. and 2.7 m. respectively. In the second fortnight of November there were three days of snowfall which descended upto a place of height 1520 m. The total depths of snowfall at Holi, Jalsu pass and Kwarsi pass were 5 cm., 1.5 m. and 2.3 m. respectively. During December there were two snowfalls in the third week and one on the last day of the month. The earlier two falls were heavier and were experienced at a place of height of 1520 m. which reported about 5 cm. to 8 cm. depth of snow. The last fall was confined to the higher peaks and passes of Dhaula Dhar, the total depths of Jalsu and Kwarsi were 46 cm. and 69 cm. respectively. The heaviest falls occurred during November when the depths at Jalsu and Kwarsi passes were 90 cm. and 1.4 m. respectively on the 26th-27th of the month.

The amounts of snow accumulation at the end of each month were as under :-

| Name of pass | Accumulation | | |
|---|---|---|---|
| | October | November | December |
| Jalsu (3810 m.) | 1.5 m. | 2.4 m. | 2.7 m. |
| Kwarsi (4420 m.) | 2.4 m. | 3.0 m. | 3.7 m. |

The snowfall was above normal in October and November and below normal in December.

Bharmaur :

Bharmaur Range :- The regions above 2230 m. experienced snowfall on the night of 29th-30th October, Bharmaur receiving about 4 cm. snowfall. The report for November was not received. Snowfalls occurred in December and the total depths were 3 cm. at Bharmaur and 1.2 m. each at Ghator and Baliani passes. There was no accumulation of snow at the end of the period.

MAHASU DISTRICT

Chopal (2342 m.) - No snow fell in October. The first snowfall was experienced on the 1st November, the depth of snow being 10 cm. at the station proper. The snowfall descended to heights of 1220 m. on the ranges of the Tehsil. The highest peak of Chur Dhar received about 60 cm. snowfall while about 30 cm. depth was observed on the lower peaks. A heavy spell of snowfall occurred on two days in the third week of December, the total depth amounting to 38 cm. at the station. The depth of snow on the well known peaks varied from 90 cm. to 1.2 m. The snowfalls were experienced even at the lower elevations of 760 m. in the Tehsil. The maximum fall recorded at Chopal was 27 cm. on the 17th December. The accumulation of snow at the end of the period was 15 cm. at Chopal and varied from 90 cm. to 1.2 m. on the well known peaks like Chur Dhar, Khirki, Chhattar, Talra, Mandha Lani and Chhachpur.

The snowfall was above normal in November and December.

Phancha (Pandra Bis Range) (2271 m.) - The reports for October and November were not received. The station reported unusually early snowfalls. These falls occurred on five days in December, including a spell of light to heavy snowfalls on four days in the third week of the month. The total depth recorded was 67 cm. of which 38 cm. fell on the 17th December.

The snowfall was above normal in December.

Junga (1989 m.) - No snowfalls were reported during the period.

Rampur (1067 m.) - There were no snowfalls during the October and November. Snow fell on the 17th-18th December and was experienced at heights of 1680 m. throughout the area of the Tehsil. The depth of snow was estimated to be about 1.2 m. on the high peaks. The amounts of snow accumulation on Murar Kanda were 1.5 m. and about 30 cm. on the lower peaks.

Kumarsain (1388 m.) - No snow fell during the period.

Theog (2286 m.) - There were no snowfalls during October and November. Snowfalls were reported in December, the total depth amounting to 76 cm.

Kotgarh (1829 m.) - The reports for October and November were not received. There was a spell of snowfall lasting three days in the third week of December. The total depth of snow recorded was 20 cm.

Kotkhai (1676 m.) - No snowfall occurred during October and November. Snow fell on the 16th-17th December and the falls were stated to be earlier than usual. The

depths of snowfall were 15 cm. at Kotkhai and about 60 cm. on each of the surrounding peaks such as Naira, Joshla, Mundroo, Khara Pathar and Bagi.

The snowfall was normal during the period.

Suni (510 m.) - There was a spell of two days of snowfall in the last week of October, the falls descending to a height of 2130 m. The total depth amounted to 53 cm., the depth of snowfall on 30th October being 30 cm. No snow fell in November. About 15 cm. depth of snow was recorded for the two days of snowfall in the middle of December. At the end of October, there was 8 cm. snow accumulation on Shali Dhar (2740 m.) but by the end of the period no accumulation was present.

The snowfall was below normal during the period.

Lower Pabar Range :

(i) Bashla (2286 m.) - Snowfall amounting to 12 cm. was recorded at the station on the last two days of October. No snow fell in November. There was a spell of three days of snowfall in the third week of December, the depth of snow being 38 cm.

(ii) Khadrala (2957 m.) - On the last three days of October snowfall was experienced at the station, the total depth of snow being 33 cm. Snowfall amounting to 15 cm. was recorded on one day in the middle of November. In December snow fell on four days including a spell of three days in the third week of the month. The total depth amounted to 1.1 m. The maximum fall was 46 cm. on the 17th December.

Rohru (1524 m.) - There was no occurrence of snowfall in October and November at the station. A spell of three days of snowfall was experienced in the third week of December, the total depth amounting to 30 cm. The amounts of snow accumulation on the well known passes in the region were 90 cm. each at Khadrala and Sungri and about 1.8 m. at Chansal.

The snowfall was below normal in November and above normal in December.

Arki (1219 m.) - The report for October was not received. No snow fell during November and December.

Solan (1530 m.) - There were no snowfalls during the period.

Jubbal (1891 m.) - No snowfall was reported during the period.

JUBBAL FOREST DIVISION :- Snowfalls were said to have been experienced earlier in comparison with those of the previous years. The first snowfalls occurred on the last three days of October. The second falls took place on two days in the third week of November. The third falls of the season commenced on the 16th December and continued for a period of three days. The snowfalls were reported to have extended to the lower altitudes of 760 m. in the division during the first two falls. The heaviest falls during individual days were 46 cm. each at Bhog Dhar and Manalog in October and 76 cm. at Reoshti in December. The total depths of snowfall at some important places were reported as under :-

| Name of place | Depth of Snowfall | | |
|---|---|---|---|
| | October | November | December |
| Khirki (2440 m.) | 99 cm. | 15 cm. | - |
| Bhog (2130 m.) | 15 cm. | 3 cm. | 1.1 m. |
| Deya (2230 m.) | 20 cm. | 4 cm. | 1.1 m. |
| Halan (2100 m.) | 3 cm. | 3 cm. | - |
| Chuhar (3660 m.) | 91 cm. | 43 cm. | 1.2 m. |
| Banah (2130 m.) | 46 cm. | 5 cm. | 76 cm. |
| Manalog (2530 m.) | 66 cm. | 8 cm. | 1.2 m. |

| Name of place | Depth of Snowfall | | |
|---|---|---|---|
| | October | November | December |
| Lutkhari (2440 m.) | 53 cm. | 5 cm. | - |
| Chhachpur F.R.H. (2110 m.) | 20 cm. | 10 cm. | 1.2 m. |
| Ori (2680 m.) | 20 cm. | 10 cm. | - |
| Bharach (3080 m.) | 25 cm. | 15 cm. | 1.5 m. |
| Mandha Ghati (2500 m.) | - | - | 91 cm. |
| Tharoach (2080 m.) | - | - | 91 cm. |
| Reoshti (2290 m.) | - | - | 1.2 m. |

The amounts of snow accumulation at the ends of October and December are given below. There was hardly any snow accumulation at the end of November except on the very high peaks, where the amount was about 20 cm. in depth.

| Name of place | Accumulation | |
|---|---|---|
| | October | December |
| Khirki (2440 m.) | 76 cm. | - |
| Bhog (2130 m.) | 10 cm. | - |
| Deya (2230 m.) | 20 cm. | - |
| Halan (2100 m.) | 30 cm. | - |
| Chuhar (3660 m.) | 91 cm. | 1.2 m. |
| Banah (2130 m.) | 46 cm. | - |
| Manalog (2530 m.) | 61 cm. | 1.2 m. |
| Lutkhari (2440 m.) | 46 cm. | 1.1 m. |
| Chhachpur (2110 m.) | 20 cm. | 1.2 m. |
| Ori (2680 m.) | 20 cm. | - |
| Bharach (3080 m.) | 25 cm. | 1.5 m. |
| Mandha Ghati (2500 m.) | - | 91 cm. |
| Reoshti (2290 m.) | - | 1.2 m. |

The snowfall was above normal in October and normal in November and December.

Kasumpti (1989 m.) - No snow fell during October and November. Snowfall occurred in December and the total depth reported was 43 cm.

KINNAUR DISTRICT

Kilba - Kailash Range :

(i) Kilba (1829 m.) - There was no snowfall during October. The first snowfall occurred on 16th November, the depth being 3 cm. In December snow fell in a spell of three days in the third week, the total amounting to 48 cm.

The snowfall in October was below normal, normal in November and in December above normal.

(ii) Sangla (2591 m.) - The station experienced snowfall on the last two days of October; the depth recorded was 18 cm. There were two days of snowfall in the second fortnight of November, the total depth being 14 cm. In December heavier falls were reported on two days in the latter half, the depth being 47 cm.

Snowfall in October was normal and was above normal in November and December.

(iii) Purbani (2286 m.) - The station received snowfall on the last two days in October, two days in the second fortnight of November and three days in the third week of December. The total depths in these months were 10 cm., 14 cm. and 41 cm. respectively.

Snowfall in October was below normal and above normal in November and December.

Chini (2774 m.) - The total depths of snowfall at the station were 10 cm. in October, 23 cm. in November and 41 cm. in December.

Snowfall in October was below normal, above normal in November and normal in December.

Kalpa - No snowfall was reported in October. The depths of snowfall during November and December were 34 cm. and 36 cm. respectively.

KANGRA DISTRICT

Banjar (Inner Seraj Sub-Tehsil) (640 m.) - The reports for October and November were not received. The region experienced good snowfall in December, the depth of snow recorded at Banjar was 8 cm. The depths of snowfall and the accumulations on the well known peaks of the region were as under :-

| Name of peak | Depths of snowfall December | Accumulation December | |
|---|---|---|---|
| | | Beginning | End |
| Raghopur | 2.0 m. | 15 cm. | 1.2 m. |
| Jalori | 1.7 m. | 15 cm. | 91 cm. |
| Sakirn | 2.3 m. | 15 cm. | 1.5 m. |
| Lambri | 2.6 m. | 15 cm. | 2.1 m. |
| Shepakaru | 3.8 m. | 30 cm. | 3.0 m. |
| Gargarasan | 3.7 m. | 30 cm. | 3.0 m. |
| Bashelu | 2.7 m. | 30 cm. | 1.8 m. |
| Pallach | 1.5 m. | - | 30 cm. |
| Tirth | 4.6 m. | 30 cm. | 3.4 m. |

The snowfall was above normal in December.

Nirmand (Outer Seraj Sub-Tehsil) (1218 m.) - The reports for October and November were not received. Snowfalls were experienced in the region on the 16th-17th December at heights above 2130 m. The depths of snowfall and the accumulation on some well known peaks in the region were reported as under :-

| Name of peak | Depth of snowfall December | Accumulation December | |
|---|---|---|---|
| | | Beginning | End |
| Sirikhand | 3.0 m. | 91 cm. | 3.4 m. |
| Chol | 1.7 m. | 76 cm. | 1.8 m. |
| Maghan | 91 cm. | 61 cm. | 1.1 m. |
| Dundku | 1.2 m. | 91 cm. | 1.5 m. |
| Shikar | 91 cm. | 76 cm. | 1.2 m. |
| Ramgarh | 76 cm. | 46 cm. | 91 cm. |
| Nohun | 76 cm. | 46 cm. | 91 cm. |

The snowfall was above normal in December.

MANDI DISTRICT

Mandi Forest Division :- There were no snowfalls in October. In November snowfall was experienced on Nargu Peak (3960 m.) during the second fortnight; the depth was estimated to be about 30 cm. Snowfall was observed on the peaks of Nargu and Tunga Devi (3050 m.) during December, the depths being 1.2 m. and 91 cm. respectively. The same amounts were reported as the accumulations at the end of the month.

The snowfall was below normal during the period.

## III. UTTAR PRADESH

TEHRI-GARHWAL DISTRICT :- No snow fell in October and November. Continuous snowfall of varying amount was experienced on the ridges above 1070 m. from 16th-18th December. The well known higher passes such as Dhanolti, Nagtiba, Surkanda and Taru-ka-Danda were covered with snow.

The snowfall was normal in December.

GARHWAL DISTRICT :- Snowfall occurred on the 30th October on the higher ranges above 1830 m., the total depths varying upto 15 cm. No snow fell in November. There were two snowfalls on the 17th and 18th December in the northern part of the district only. The depths of snowfall were 1 cm. in the inhabited areas and about 60 cm. on the peaks and surrounding areas on the ranges.

The snowfall was above normal in October and December and below normal in November.

ALMORA DISTRICT :- The depths of snowfall and the amounts of snow accumulation at the end of each month on the well known peaks of Malla Danpur were as under :-

| Name of peak | October | November | December |
|---|---|---|---|
| SNOWFALL | | | |
| Kautela | 91 cm. | 91 cm. | 1.5 m. |
| Kafini | 1.2 m. | 1.2 m. | 1.8 m. |
| Bankatia | 2.1 m. | 2.4 m. | 2.1 m. |
| Pindar | 1.5 m. | 2.4 m. | 2.1 m. |
| Nanda Devi | 2.1 m. | 2.7 m. | 2.1 m. |
| Sundardhunga | 2.1 m. | 2.4 m. | 2.1 m. |
| ACCUMULATION | | | |
| Kautela | 91 cm. | 1.2 m. | 2.7 m. |
| Kafini | 1.2 m. | 1.8 m. | 3.7 m. |
| Bankatia | 2.1 m. | 4.9 m. | 7.0 m. |
| Pindar | 1.5 m. | 4.3 m. | 6.4 m. |
| Nanda Devi | 2.1 m. | 5.2 m. | 7.3 m. |
| Sundardhunga | 2.1 m. | 4.9 m. | 7.0 m. |

The snowfall was above normal during the period.

NAINITAL DISTRICT

Mukteswar (2310 m.) - No snowfall occurred during October and November. Light to moderate continuous snow fell on the 17th and 18th December. The depths of snow recorded at 0830 hours on the 18th and 19th were 36 cm. and 13 cm. respectively. The snowfall extended towards the Himalayas covering all peaks and valleys in the district.

The snowfall was above normal in December.

## S U M M A R Y

Winter Period :- January and February

Snowfall during the period was slightly above normal in Jammu and Kashmir, above normal in Punjab (I), Himachal Pradesh and Uttar Pradesh.

Pre-monsoon Period :- March to May

Snowfall was slightly below normal in Jammu and Kashmir and normal in Pubjab. (I), Himachal Pradesh and Uttar Pradesh.

Monsoon Period :- June and July

As usual practically no snow fell in Jammu and Kashmir, Punjab (I) and Himachal Pradesh while in Uttar Pradesh it was slightly below normal.

Monsoon Period :- August and September

The snowfalls during the period were confined to the higher altitudes as usual in Jammu and Kashmir, Punjab (I) and Himachal Pradesh. In Uttar Pradesh the snowfall was below normal.

Post Monsoon Period :- October to December

The snowfall was slightly below normal in Jammu and Kashmir, slightly above normal in Punjab (I) and Himachal Pradesh and above normal in Uttar Pradesh.

N. B. :- It is not possible to adopt a single classification of seasons which will be satisfactory for the whole of India. The classification adopted in this publication is devised from the point of view of rainfall in the country.

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